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U. S. DEPARTMENT OF AGRICULTURE,

FOREST SERVICE—Circular No. 37.

GIFFORD PINCHOT, Forester.

Forest Planting in the Sand-Hill Region of Nebraska.

SPECIES SUITABLE FOR PLANTING.

Experiments in growing pine trees in the sand hills of Nebraska have been attended with results which warrant the belief that they may be planted with success in this region. Western yellow and jack pine are the most promising species for the purpose. Seedlings of these species are being extensively planted by the Forest Service of the U. S. Department of Agriculture on the Dismal River Forest Reserve. In the spring of 1905 a number of ranchmen in widely scattered localities in the sand-hill country planted experimentally a small number of jack-pine seedlings. Authentic reports from nearly all of these plantations show that the great majority of them have been successful. Only two failures have been reported, and it seems probable that these were due to unfavorable local conditions. The Bruner plantation, in the southwestern part of Holt County, furnishes further proof of the adaptability of jack pine to the sandy soils of the region. The plantation was established in the spring of 1890, and the best trees are now from 18 to 30 feet high. The grove is free from insect pests and in general is in excellent condition. Western yellow pine (bull pine), although not as fast growing as jack pine, is longer lived and is a more valuable tree when mature. For planting it is equally well adapted to the region.

SECURING PLANT MATERIAL.

Seedlings of jack pine and yellow pine of suitable size for planting in the sand hills can be obtained from several dealers. The Forest Service will furnish upon request a list of such dealers, with the prices at which plant material of the proper size is quoted. Planting leaflets, giving general directions for the planting and care of these trees, will also be sent without charge.

Most of the jack pine seedlings sold are wild stock collected in Minnesota or Wisconsin. They are usually 3 to 5 years old, and

should be 6 to 10 inches high. The yellow pine is usually nursery grown, and should be not less than 2, and preferably 3, years old when planted. The trees should be ordered in March, with instructions to have them shipped as soon as possible after April 15. Seeds also can be obtained from dealers. Home production of seedlings is not advisable unless extensive planting is contemplated.

WHERE TO PLANT.

Experience shows that planting on north slopes gives the best results. South and southwest slopes are subject to a greater degree of heat, and the moisture conditions are not as good. Situations where the sod is very dense should also be avoided. The different exposures that may be planted are, in order of suitability, the north, northeast, northwest, east, west, and southeast exposures, and, finally, the more level situations, such as valleys and crests of hills. The plan should be to plant blocks or belts of trees as windbreaks around the ranch house, barns, and yards.

TIME TO PLANT.

The best time to plant is in the spring, usually between April 20 and May 10, when rains have begun. Cloudy days should be chosen for such work.

HOW TO HANDLE THE SEEDLINGS.

When the seedlings are received at the railroad station they should be thoroughly moistened by pouring water into the boxes, which should then be wrapped in wet blankets and taken to the ranch without delay. If possible, the trees should be planted the same day they are received, but if it is necessary to hold them over they should be unpacked, puddled, and heeled-in.

PUDDLING.

Take clay or loam and mix with water to about the consistency of cream. Into this "puddle," as it is called, dip the roots of the plants just before they are heeled-in and again just before they are planted. In the puddling process a thin coating of soil is formed over the surface of the roots, serving as a protective cover.

HEELING-IN.

Select a cool, shaded spot where the surface soil is mellow and can easily be worked. Dig a trench of suitable length, say 6 feet, and of a depth which will allow the plants to extend above the ground about 2 inches. Have one side of the trench somewhat sloping. Against this sloping side spread out a layer of plants, roots down, and bank

with earth to a level with the surface. Put about 2 inches of soil against the plants, pack well, and leave the outside again somewhat sloping, and against it place the next layer of plants. Continue this process until all the plants are heeled-in. The layer of soil between each two layers of plants should be kept a uniform thickness the entire depth, and should be wide enough to prevent the tops of the different layers of plants from crowding. Great care should be taken not to make the layers of plants over 6 to 8 plants deep. The soil in which the plants are heeled-in should be moist, but not wet, and once heeled-in, if the work is done with care, they will need no further attention until the time for planting.

PLANTING.

PREPARATION OF THE GROUND.

The ground should never be plowed before planting, as this would cause it to blow and shift, and many of the young trees would be buried, with the result that the planting would probably fail entirely. Where the growth of grass is rather scant, with many bare spots, as in the sand hills proper, the ground need not be given any previous preparation whatever. In this event, the seedlings may be set out in the open spots in the manner described below. If the grass cover is heavy, and the sod quite dense and tough, as in the valleys, single furrows should be run with a stirring or breaking plow at the distance apart (usually from 4 to 6 feet) which it is desired to have the rows of trees. On rather steep slopes it will be best to run the furrows on contour lines.

SPACING.

If only a small belt is planted, say from 1 to 4 acres, a spacing of 4 by 4 feet is recommended. In this case the furrows, if any are made, should be 4 feet apart and the trees set 4 feet apart in the furrows. This spacing will require 2,720 trees per acre. If a large plantation is established, a spacing of 5 by 5 or 6 by 6 feet is recommended. This will require either 1,740 or 1,210 trees per acre. There will naturally be some loss, and the trees which die during the first year should be replaced.

By the close spacing recommended for a small grove the trees will furnish both better protection for one another and more effective shelter than if the spacing were wider. Where the plantation comprises several acres in one body, these advantages are secured, in part at least, by the larger area. Then, too, the cost of planting will be considerably less.

THE PLANTING CREW.

The planters may be organized in crews of three men each. Two men with spades or grub hoes do the planting, working side by side

in adjacent furrows or rows, while the third man, supplied with a pail partially filled with water, in which the plants are carried, walks between the two planters and hands them the trees as they are needed. It will be found advantageous for one of the planters to change with the carrier every half hour. Thus each man would plant one hour and carry the trees one-half hour in each one and one-half hour period. If enough men are not available, a boy can carry the trees. A three-man crew should plant 3,000 trees per day.

HOW TO PLANT.

When all is in readiness for planting, the trees should be put in bundles of 75 or 100 plants each. Wrap each bundle with wet moss, if such material is at hand, and about the moss wrap a wet cloth of some kind. Pieces of gunny sack will answer splendidly. These bundles may then be put in boxes or tubs, covered with wet gunny sacks, and taken to the field. The greatest care should be taken never to expose the roots of the trees to the sun and wind. Even a very short exposure may kill them. The man who carries the trees should not undertake to carry more than 300 or 400 at a time and should keep the roots well submerged in a puddle in the bottom of the pail.

To set the trees in furrows the planter puts his spade in the bottom of the furrow with the blade crosswise of it, and with his foot thrusts the blade into the ground the full length. By a few side motions of the blade as it is sinking into the ground an opening sufficiently large for the reception of the tree is made. Withdrawing the spade he places the tree in this opening with one hand while holding the spade with the other. Then, with the back of the spade toward the tree and about 2 inches from it, thrusts the blade into the ground its full length and presses the slice of earth thus made firmly against the roots of the tree at the bottom as well as at the top. The earth should be tramped firmly about the tree as the planter moves forward. The men should be cautioned not to try to plant too fast, and none but the most careful and reliable men should be put at this work.

If furrows are not used the trees may be set at proper intervals in the bare spots, the incisions being made with a spade in the way described above. It will not be possible to space the trees regularly, but they can readily be planted to average the desired distance apart.

CARE OF THE PLANTATION.

No cultivation of the planted trees is necessary. The grass which will grow up about them while they are still small will benefit them by the shade and protection it will afford. The plantation should be well fenced to exclude live stock and carefully guarded from fire.

COST OF PLANTING.

It is impossible to give an accurate estimate of the cost of planting, because the price of plant material and the wages paid for labor vary. Wild seedlings of jack pine are usually obtainable from Minnesota at a cost of about $5 per thousand delivered, but nursery stock is usually quoted at from $5 to $12 per thousand. Yellow pine usually sells at from $6 to $15 per thousand. With labor at $1.50 per day it would cost $1.80 to plant an acre, spacing the trees 6 by 6 feet apart each way, or 1,210 per acre. If furrows were plowed it would require a man and team one-sixth of a day, which, at $3, would amount to $0.50, or a total cost per acre, aside from the plant material, of $2.30. If the planting is done in connection with the regular ranch work this cost for labor can be disregarded.

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